ATOMIC ENERGY

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Dear Sir:

President Eisenhower confirmed in a statement sent to Congress last fortnight that the United States in 1952 had made the first full-scale thermonuclear explosion in history at the Pacific proving ground. This was the first official statement concerning the test of fission weapons; the President called the test a "necessary first step in the hydrogen weapon program of the United States".

Great Britain's fifth nuclear reactor has now reached the stage of criticality, and gone into operation at the Atomic Energy Research Establishment, Harwell. It is a "fast" reactor, utilizing plutonium, and is called "Zephyr", as it is of zero energy, developing not more than one or two watts of power. Expressly designed as an experimental unit, in the course of Britain's efforts in nuclear power production, an alloy of sodium and potassium metals has been used as a heat transfer agent.

An American Chemical Society award in nuclear applications in chemistry has now been established under the sponsorship of Nuclear Instrument and Chemical Corp., Chicago, manufacturers of instruments for radiation detection and measurement. The award is open to scientists of any age or nationality who use radioisotopes in chemical or chemical engineering work, and will be made annually. Nominations are now being solicited by the ACS; full information may be obtained from the Society in Washington, D. C.

A large expansion is to be undertaken by Texas City Chemicals, Inc., (of Texas City, Texas), officials of that company have now stated. The firm has a ten-year contract with the USAEC for recovery of uranium values from phosphate rock. According to S. A. Winfree, vice-president and general manager of Texas City Chemicals, the expansion program will start this Fall if research now underway is successful. He was referring to research involving the company's process for recovery of uranium from phosphate rock.

The sixth annual Oak Ridge Summer Symposium, which will be held at Oak Ridge this August 23-27, will be concerned with Modern Analytical Chemistry. The symposium will consist of a series of lectures by well known speakers in the field, together with several round-table discussions on certain methods in analytical chemistry. (These Summer symposia have been offered annually by the Oak Ridge National Laboratory, and the Oak Ridge Institute of Nuclear Studies. Further details on the forthcoming symposium may be obtained from the Institute, at P.O. Box 117, Oak Ridge, Tenn.)

The study of the feasibility of power producing nuclear reactors has been facilitated by the removal from the secret list of certain technical data as a result of the recommendations of the 6th international Declassifications Conference held at Chalk River, Ontario, last Spring, the Honorable C.D. Howe stated last fortnight in Canada. At the conference, representatives of Canada, the United Kingdom, and the United States, discussed the revision of the declassification guide used by the three nations to decide what atomic energy information may be published.

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NEW SERVICES, PROCESSES & DEVELOPMENTS...in the nuclear field...

SERVICES: Extension of its radioactive waste disposal service beyond a 150-mile radius of New York City (its previous limits), has now been put into effect by Radiological Service Co., Inc., Jamaica 33, N.Y. The company handles this disposal by having the user imbed liquid wastes in concrete. Solids are then shipped by common carrier to the company, for disposal.

DEVELOPMENTS: A 2-million volt Van de Graaff X-ray generator that will be used for industrial radiography has now been installed in a plant of Foster-Wheeler, at Mountaintop, Pa. Manufactured by High Voltage Engineering Co., Cambridge, the Van de Graaff generator will produce X-rays that are capable of penetrating steel up to 12-inches thick, to photograph weld metal. The unit was originally developed for use in cancer therapy; a forerunner of this type has been used in a number of hospitals.

An X-ray camera, which is capable of studying materials at temperatures up to 4,000-deg. F., is now in use in ceramics research work at Oak Ridge National Laboratory. Developed by the staff at Oak Ridge, the camera has been used successfully to produce diffraction patterns in studies of hafnium oxide, as well as a number of other oxides and metals.

The Radio Corp. of America demonstrated last fortnight in New York a device producing an electrical current consisting of a transitor-like wafer of silicon coupled with a quantity of strontium-90. Output was approximately one-fifth of a volt, at 5 microamperes, with an efficiency of approximately 0.4%. RCA termed this the "first atomic battery", and the "first direct conversion of nuclear energy into electrical energy". Meanwhile, in Cincinnati, Mr. Philip E. Ohmart, head of Ohmart Corp., challenged RCA's claims. Mr. Ohmart said that as early as June, 1950, useful electricity was produced by directly converting radioactive energy into electrical energy. He said that the work leading to this discovery was done by him while at the Mound Laboratories, operated by Monsanto Chemical for the USAEC. Since then, Mr. Ohmart has formed the Ohmart Corp., which has developed and sells instruments based on his discoveries. The firm stated that today Ohmart has some 125 actual installations for measurement, (with Ohmart devices,) of specific gravities, slurry densities, liquid levels, and liquid interface levels. (The Ohmart method involves the use of electro-chemically dissimilar electrodes, separated by non-conducting material, which, on exposure to radioactivity, convert this radioactivity directly to electric energy.)

PEOPLE...in the atomic energy program...

Walter J. Williams, who was deputy general manager of the USAEC, has resigned after ten years of service in the atomic energy program under both the War Department and the USAEC. Mr. Williams is taking a position as vice president of the Taconite Contracting Corp., subsidiary of Erie Mining Co.

New manager of the USAEC's Santa Fe Operations Office is to be Donald J. Leehey; he will succeed Carroll L. Tyler, who is resigning Feb. 15, 1954. Mr. Leehey, a West Point Graduate of 1920, has spent his entire career in the U.S. Army, resigning in 1946. Mr. Leehey was president of the Envelopener Corp., Harrison, N.Y., since 1949. (The Envelopener Corp. manufactured envelopes which are opened by pulling a piece of string.) Mr. Leehey, as manager of the Santa Fe Operations Office, will have jurisdiction over research, development, production, and testing of atomic weapons.

Isaac Harter, former chairman of the board of Babcock & Wilcox Tube Co., has been elected a director of Vitro Corp. of America, according to J. Carlton Ward, Jr., president of Vitro. Mr. Harter has worked with the USAEC on its industrial advisory group, and is a member of the USAEC's patent compensation board. He has also participated in the activities of Brookhaven National Laboratory, L.I. (Vitro Corp. of America is engaged in research and development, engineering, chemical processing, production of ceramic colors and chemical products, and the refining of uranium ores. It embraces, within the scope of these activities, a large degree of participation in the U. S. atomic energy program.)

ATOMIC ENERGY PROGRESS IN THE UNITED STATES:- July-December, 1953 (A condensation of highlights from the USAEC's 15th semi-annual report, of Jan. 30, 1954).

REACTOR DEVELOPMENT: For developing improved nuclear reactors for industrial nuclear power, and for naval and aircraft propulsion, expenditures of some $150 million are earmarked for the fiscal year ending June 30, 1954. Research was also aimed specifically at improving production reactors at Hanford and Savannah River. Development activities, by the USAEC and industrial participating groups, indicated four major technical avenues to power from nuclear fuel at a cost which may eventually be comparable with the cost of power from coal, oil, or gas. These involve nuclear reactors of the pressurized water; sodium & graphite; fast breeder; and homogeneous types. Indications are that the first two types can be tested out in a fairly short time; 3 to 5 years have been estimated for completion of a full-scale plant. For a large plant of the third and fourth designs, some 5 to 10 years work will be necessary.

Pressurized Water Reactor: The new nuclear power plant, of at least 60,000-kilowatts, on which Westinghouse Electric will handle the reactor part, and which is to produce usable electrical energy, will utilize the pressurized water reactor. Wide participation by private enterprise is being invited. Competitive bidding will be the general rule in purchasing components. Research and development on the reactor is well underway; it is expected that it should be in operation in 3-or 4-years.

Sodium & Graphite Power Reactor: North American Aviation is the major contractor exploring this particular reactor which would be cooled by liquid sodium and moderated by graphite. It would require slightly enriched uranium fuel.

Breeder Reactor: Argonne National Laboratory continued its long-range research and development toward a practical breeder reactor for power--a reactor that would produce as much fissionable material as it consumes or more. A fast reactor in which fuel is fissioned largely by fast neutrons now appears to be most attractive for this purpose.

Homogeneous Reactor: This experimental reactor, with a 1,000-kilowatt heat output, is operated at Oak Ridge National Laboratory. Potential advantages include simple chemical processing of fuel, simplicity of construction, and elimination of fuel fabrication.

Industrial Participation: Of those industrial groups which have been investigating the problem of economic nuclear power, the Dow Chemical-Detroit Edison group has the largest manpower concentration at the work: 40 scientists and engineers who are devoting full-time efforts. Work is being done on an enriched, low-melting-point alloy for use in fuel elements, and in the breeder blanket. Operation of the reactor and its chemical fuel processing facilities would be integrated at one location. Dow Chemical and three of the associated companies --Allis Chalmers; Babcock & Wilcox; and Ford Motor--are doing physical research and development on the proposed reactor. In addition, the group has contracted with Nuclear Development Associates, White Plains, N.Y.; Mine Safety Appliance, Pittsburgh; Clifford Manufacturing, Waltham, Mass.; and Modine Manufacturing, Racine, Wisc.; to perform various investigations. Projects include development and fabrication of fuel elements and development of liquid metal test loops. The design and cost studies of this group are based on a commercial fuel value for the byproduct fissionable material and fission products; it is assumed the reactor and processing plant would be free of government subsidy, and privately self-sustaining.

PRODUCTION OF FISSIONABLE MATERIALS: Now in operation at Fernald, Ohio, are all the plants there of the Feed Materials Production Center. In addition, work is being done on construction of other production facilities at Hanford, Wash.; Oak Ridge, Tenn.; Paducah, Ky.; Portsmouth, Ohio; and at the Savannah River Plant, in South Carolina. To supply electrical power to the Oak Ridge, Paducah, and Portsmouth gaseous diffusion plants, long-term contracts were formally signed by the USAEC with Electric Energy, Inc., (operating the Joppa, Ill., station), and the Ohio Valley Electric Corp. (operating the Kyger Creek plant, near Cheshire, Ohio, and Clifty Creek Plant, near Madison, Ind.). These contracts were authorized by Public Law 137, of the last (83rd) Congress. Among their provisions are clauses which provide specific provision for the payment to the utilities of concellation costs, in the event the USAEC terminates them.

ATOMIC ENERGY PROGRESS IN THE UNITED STATES: July-Dec., 1953 (Cont'd)

CONSTRUCTION: During the second half of 1953 about $100 million a month in costs were being incurred (by the USAEC) for new plant and equipment: this compared with an average of $97 million a month in the first half of that year. Approximately 97% of the direct contract awards were made to "large" business concerns (over 500 employees), of the $4.1 billion in contracts awarded by the USAEC from July 1, 1951, to September 30, 1953. (Sub-contracts enable "small" business to participate in the atomic energy program; in this same period, 38% of the sub-contracts let by these "large" business concerns, under these USAEC prime contracts, were to "small" business firms, these sub-contracts totaling some $1.6 billion.)

FISSION & FUSION WEAPONS: Production of weapons using fissionable materials was at the rate set by the USAEC acting in concord with U. S. military leaders. Research and development activities during the period continued to be directed toward the design of new and improved weapons; meanwhile, preparations are underway for a test series at the Pacific proving ground. (Major work in research, development, and testing of weapons has been performed by Los Alamos Scientific Laboratory, and Sandia Laboratory, which are operated for the USAEC under contract by the University of California, and Western Electric Co., respectively. Additionally, a weapons research laboratory, operated by the University, is maintained by the USAEC at Livermore, Calif. There is also a separate research and development project, at Livermore, handled by the California Research & Development Co., subsidiary of Standard Oil Co. of Calif. (Supervision is by the USAEC's Santa Fe Operations Office, which supervises as well several other installations related to the weapons program.)

ISOTOPES: By the end of the year, some 1,858 institutions in the United States had requested USAEC authorization to use reactor-produced radioisotopes; this was an increase of about 30% in one year. The largest single category of users was industry: here, there was an increasing use of such materials.

The principal isotope production center in the United States continued to be the graphite reactor at Oak Ridge. Shipments now average almost 1,000 a month from this facility: to date, about 50,000 radioisotope shipments have been made. During the past 6 months, prices were reduced for quantity purchases of the most widely used radioisotopes: radiocarbon, radiophosphorous, radioiodine and radiothallium (used in thickness gauges). Commercial participation in isotopes distribution continued to increase. In 1953 additional private firms were processing and distributing radioactive materials bought from the USAEC. The work of these firms consisted of refining radioisotopes for biological and medical use; synthesizing special radioactive compounds for research; and preparing radioactive sources for thickness gauges and radiographic testing. Studies were made for the USAEC by Tracerlab, Inc., and Bendix Aviation Corp., which indicated that complete commercial handling of isotope production is not now feasible, nor will it be within the next 5-years.

RAW MATERIALS: Uranium ore is being produced in the United States from over 525 mines, mostly on the Colorado Plateau. Some production is also coming from the Marysvale, Utah, district, the Colorado Front Range; and the area near Boulder, Montana. Mining methods are changing; mine operators who a few years ago were mining ores mostly from the rims of canyons, or through inclined shafts a short distance back from the rim, are now mining through vertical shafts as the more easily accessible deposits are depleted and deeper deposits are discovered and developed. A firm new in ore processing will be Kerr-McGee Oil Industries, Inc., when its plant, now under construction, is completed. Other processing firms were Anaconda Copper, Vanadium Corp. of America, and Climax Uranium.

Uranium from abroad continued to supply a large share of the USAEC's requirements. The Belgian Congo, with its high output from the Unione Miniere du Haut-Katanga's operations, continued as a major producer. Receipts from South Africa increased, as additional plants there went into operation to recover uranium as a by-product of the gold mining industry on the Witswatersrand. Canada also sold most of its uranium output to the USAEC.

ATOMIC PATENT DIGEST...news of patents in nuclear field...

PATENTS RELEASED: A new group of patented inventions, developed in the course of nuclear research in the U. S., has now been made available on a royalty-free (but non-exclusive) basis to U. S. firms. Inquiries concerning this list (as well as those previously so released) should be directed to Patent Branch, USAEC, 1901 Constitution Ave., Wash. 25, D. C. This group comprises: (1) Focusing divergent beams of charged particles; no. 2,658,150. (2) Improved electro-magnetic pump for pumping electrically conducting liquids; no. 2,658,452. (3) Method for separating the mono- and di-alkyl esters of phosphoric acid; no. 2,658,909. (4) Process of welding beryllium-base metals; no. 2,658,981. (5) Means for controlling accelerating voltage in a particle accelerator of the bevatron type; no. 2,658,999. (6) X-Ray densitometer; no. 2,659,012. (7) Combination badge and radiation meter for individuals subject to ionizing radiations; no. 2,659,013. (8) Integrating accelerometer for recording variations in velocity of a moving body; no. 2,659,589. (9) Isotope separation equipment; no. 2,659,822. (10) Radiation measuring device; no. 2,659,826. (11) Ion selector; no. 2,660,677. (12) Plate design for pulse columns; no. 2,662,001. (13) Producing thermoplastic halocarbon polymers; no. 2,662,072. (14) Transmission fluorimeter; no. 2,663,801. (15) Neutron detector; no. 2,663,802. (16) Process for preparing perhalocarbons of low and intermediate molecular weight; no. 2,664,449. (17) Electron multiplier capable of operating in a magnetic field; no. 2,664,515. (18) Container for neutron irradiated material; no. 2,664,998. (19) Ion accelerating and focusing systems; no. 2,665,384. (20) Spectrometer improvements; no. 2,666,147. (21) Rapid operation air lock for closed vessels; no. 2,666,539. (22) Radiation detection and survey instrument; no. 2,666,865. (23) Crystal operated oscillograph; no. 2,667,104. (24) Liquid level control; no. 2,667,178. (25) Process for producing a tough thermoplastic; no. 2,667,474. (26) Mass separator; no. 2,667,582.

BOOKS & OTHER PUBLICATIONS... on nuclear subjects...

Approximate Formulae for use in Neutron Shielding. A report of work done at Atomic Energy Research Establishment, Harwell (England). 16 pages. --British Information Services, New York 20, N. Y. (65¢)

Concepts of Radiological Health: Part I, Radiation Production & Absorption; Part II, Biologic Effects of Radiation Absorption. A manual for public health administrators without special training in physics. 48 pages. --Superintendent of Documents, Wash. 25 D.C. (45¢)

NOTES: A condensation of three papers on nuclear energy subjects appears in the February, 1954, "Mechanical Engineering". (American Society of Mechanical Engineers, 29 W. 39th St., New York 18). The papers summarized in this article were presented at the ASME's annual meeting, Dec., 1953, at a session sponsored by the Nuclear Energy Application Commmittee: "Status of Nuclear Power Technology"; "Problem From an Economic Standpoint"; and "The Legal Situation".

The first issue of "Radiation Research", official organ of the Radiation Research Society, has now been released by the publishers, Academic Press, 125 E. 23rd St., New York 10. Intent of the new journal is to assist physicists, chemists, biologists and medical researchers to keep abreast new developments in the field of radiation (ionizing, ultraviolet, infrared, and visible radiations).

RAW MATERIALS...radioactive mineral and ore developments...

United States: Some 60,000 square miles, on various public lands in the West, are now open to uranium mining lease grants. The lease applications must be filed before March 1st, 1954. Full information is given in the USAEC's "Domestic Uranium Program Circular 7", copies of which may be obtained from the USAEC's Grand Junction Operations Office, P.O. Box 270, Grand Junction, Colo.

Australia: An analysis of prices which the Atomic Energy Commission (Australia) will pay uranium ore producers shows these prices as considerably lower than producers in the United States and Canada receive from their respective government buying agencies. All three countries, however, make special price adjustments for unusual mining circumstances.

Sincerely,

The Staff,
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